Written testimony of

Lydia Lundberg

Owner, Elite Care - Oatfield Estates
A Residential Care Facility in
Milwaukie, Oregon

Presented to:

US SENATE SPECIAL COMMITTEE ON AGING

Hearing on:

Assistive Technology for Aging Populations

Tuesday, April 27th, 2004
10:00am
628 Dirksen Senate Office Building

Good morning Chairman Craig and members of the committee. My name is Lydia Lundberg and I am the co-owner of the most technologically advanced elder care facility in the world. We are getting visitors from around the world, to see what we are doing. As a leader in the effort to develop this technology, I am on the commission of CAST (Center for Aging Services Technology) and am asked to speak around the world on this subject.

We are a small family- run entrepreneurial business, who believes that if we are to enjoy our OWN OLD AGE, a paradigm shift is necessary in the care of our elders, We are investing our retirement savings to develop a system for long term care, that incorporates both technology and a mission to create elder directed communities..

While many see the increasing numbers of frail elders as a burden on our society, we believe that they are part of the solution. With the use of proper assistive technologies, they can retain their active, positive role and contribute to the environment regardless of where they live.

With our design of the Extended Family Residence™ and the use of technology, we are re-creating the farm families of the past, while integrating technology of the future. In this model, every generation has value and purpose. Information gleaned from the technology is used to allow elders to live an engaged, purposeful life.

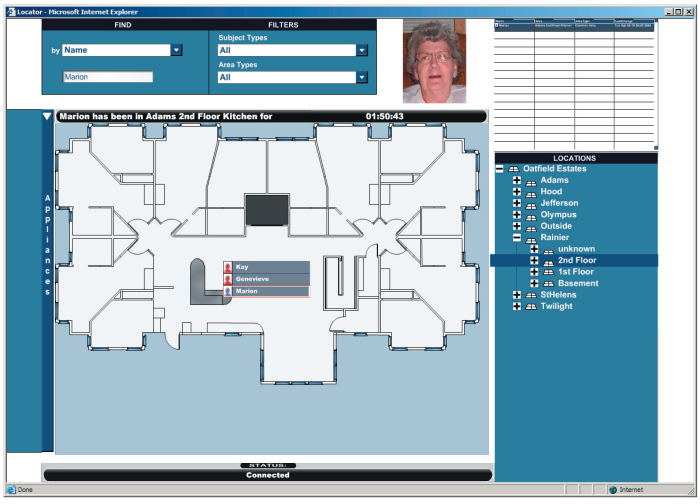
In addition, our family portal technology brings peace of mind to the families of the elderly. Today, the lack of information about parents causes kids to worry. We are constantly thinking, "Mom got lost coming home from the store yesterday, she can't live by herself anymore.". "What is mom doing all day? Is she eating properly? " When Alzheimers / short term memory loss is involved, kids tend to 'fix' the problem by incarcerating their parents in locked Alzheimer's facilities.

About 50% of our residents would be in locked Alzheimers facilities. Instead they live in 12-suite houses, where they can participate in life to the best of their abilities. Residents are not separated by diagnosis or cognitive ability. The technology supports their independence, safety, and puts the families' mind at ease.

Although we are a Residential Care Facility, the technology and algorithms we are developing will enable all elders to function at their highest level. Thus keeping them in their home longer, in Assisted Living / Residential Care Facilities longer, and hopefully keeping them out of Skilled Nursing Facilities and Hospitals .

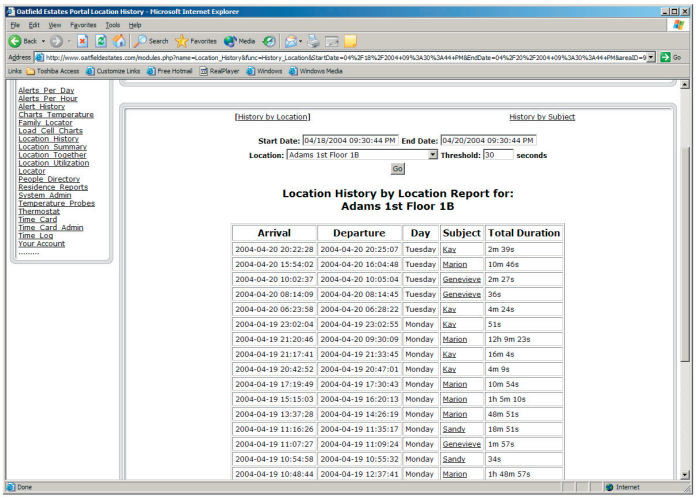
Demonstration of technology:

The family portal is one of the features that demonstrates what our technology can do. This is great for families who want to be more involved with their parent's care. It is a secure internet connection, password protected. It is our hope that when we get this perfected, we can install this system into individual homes.



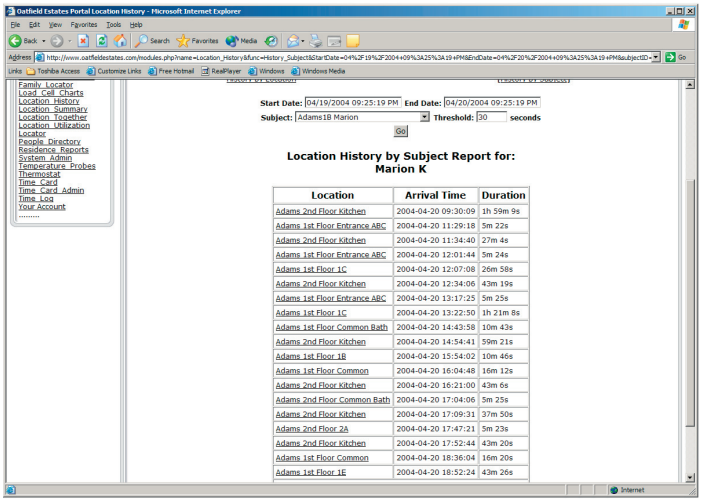
The Visual Locator

shows where Marion is at this time. She is moving around and we can see every time she leaves or enters a room. She will go sit on the bed and it shows the instant load cell readings.



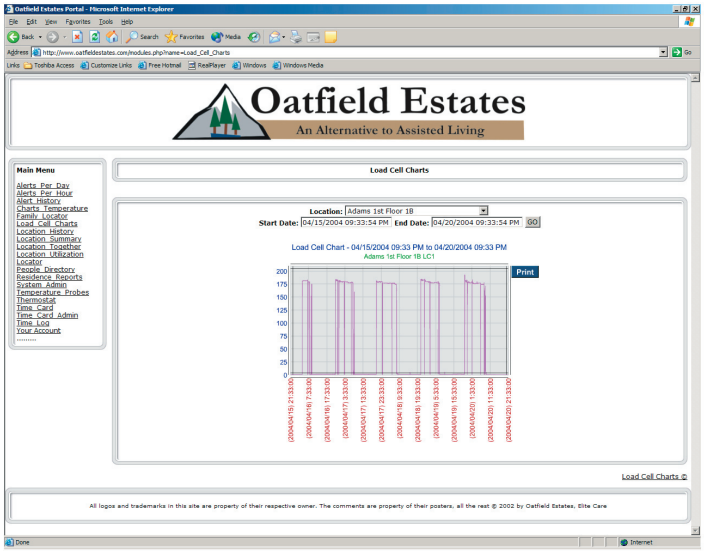
Location History / Suite

If I want to know who has been in her room, I can go to the location history, which shows by name, who was in her room and how long they stayed. This gives me an indication if he is getting the care she requires. I don't know exactly what they are doing, but by the time of the visits, the duration and knowing what care she requires, I can make assumptions.



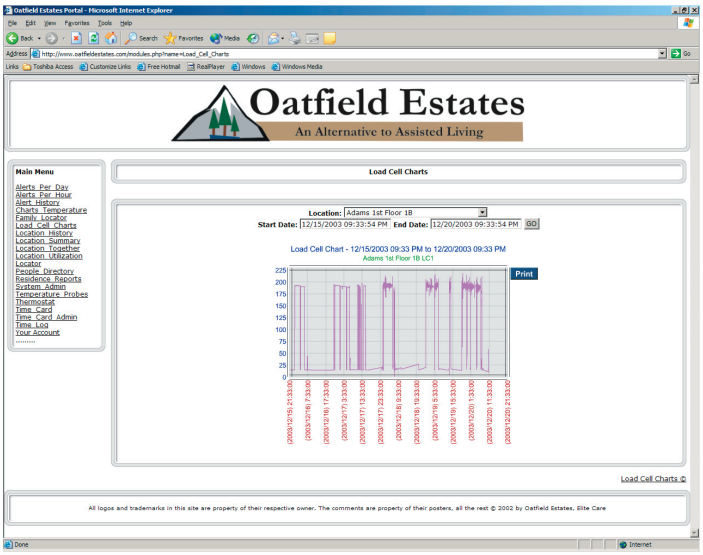
Location History / Person

If I want to know, where Marion has been spending her time, I can go to the location history. It shows how much time he was spending in the main area or in her suite.



Load Cell Charts

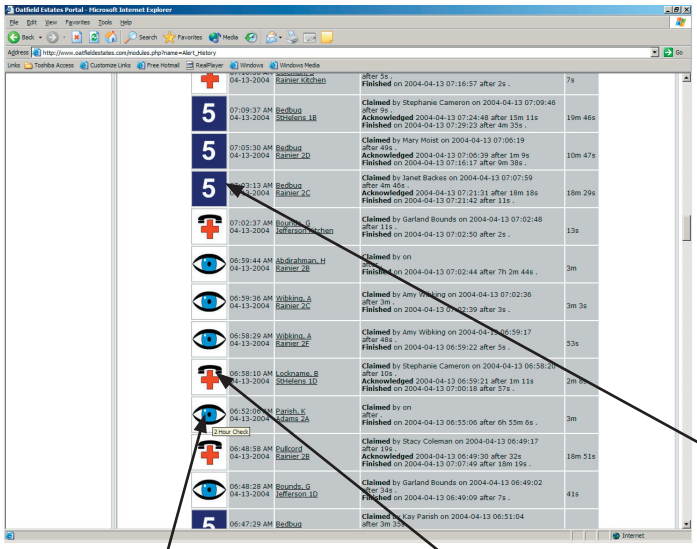
This shows 5 days of load cell readings for Marion. It shows that her sleep patterns are the same for 5 nights. This is valuable information for many reasons. If there is a change in medication, and it affects her sleeping, it would show up here. She wouldn't necessarily be able to tell me. I can go back in time for as long as she has been at Oatfield Estates.



Here is a Load Cell chart from 6 months ago. It looks like Marion was tossing and turning a lot more and getting out of bed at night. This could be caused by different medication at the time.

Manangement Information:

In addition to having the location and load cell information available for all residents, just as you saw in the Family Portal, as management I can check alert history for any time frame. This screens shows the alerts that happen in any given time.



Bed Bug
uses the load cells under a residents bed, to alert the staff when he/she gets out of bed. This is used for residents who are a fall or wandering risk. It can be turned on to work al day or only at night.

Resident Alert
This is an alert that was initiated by a resident's wireless badge. It shows who it is and where they are.

Two Hour Check Alert
When a resident needs to have staff check them every 2 hours at night, the system issues an alert, to remind the staff who and when they need to check on. As a double check I could go to the location history and see if the staff really went into the suite.

This report also shows me, who responded to the alert, how long it took to respond and how long the staff spent with the resident.

Visual Locator

With the visual locator, I can visually see who is where. Where the staff are (red icons), where the residents are (blue icons). I can see the temperatures, if doors are open or closed, if lights are on, if fans are on, and who is in bed.

The information collected by the load cells and the location are stored in a data base. The screens I have shown you represent a fraction of information that can be gotten from this data base. Currently we consider it a DRIPsystem, data rich - information poor.

What we need:

- Funding for research to develop algorithms that will lead to actionable information. “Is dad not moving around as much as he used to? Is he sleeping more / less? Is he losing or gaining weight?”
- Long term, research can also develop predictive models. “When there is x % of change in movement, you need to worry about Y (Heart Failure, etc)”. This information can then be used for giving warning to the elder, physician, family and possibly prevent hospitalization.
- We believe there should be more opportunities and research dollars for supporting long term care technology R&R like the NIST ATP Grant, which we have applied for. (See Addendum)
- We are trying to develop partnerships with universities, such as Oregon Health Sciences University and companies like Intel. It is challenging to bring together providers, researchers and tech companies to work together on these problems. It is critical that we do so.
- More work needs to be done to develop sensors that are cost effective and are easily used, for automatic collection of data. This can lead to predicting falls, strokes, heart attacks, thus allowing for interventions that may prevent these things from happening. Great savings in health care cost, great maintenance of quality of life.
- Tax incentives to encourage early adopters.
- A method for re-imbursing costs of implementation of technology such as:
  - reduction in liability insurance
  - reduction in management staff
  - insurance / medicare payment for implementing technology in homes or LTC’s
- Standards for easier integration of software and hardware
- Acceptance and encouragement of electronic data by the government for both MediCare re-imburse ment and quality control standards.
- Reduction of cost of hardware, wiring, retrofitting.

Addendum

Application for NIST ATP (National Institute for Standards and Technology, Advanced Technology Program) Elite Care applied for a $2,000,000 grant on April 14th, 2004. Receiving this grant would greatly enhance our ability to further develop technology so desperately needed for the care of our elders. Below is the Executive Summary of our application., along with letters of support.

EXECUTIVE SUMMARY

Long term care (LTC) in the U.S. currently cares for over 2 million elderly residents. This number is expected to greatly increase as the baby-boomers reach their elder years in the immediate decades ahead with the associated increase in the cost burden on Medicare and Medicaid. In addition, facilities are challenged to provide adequate care using minimally trained staff, whose turnover rate exceeds 100% per year. Thus, facilities often cannot adequately monitor residents for care needs or changing health risks. This project aims to create and test and anticipatory interactive feedback management system which increases caregivers' competence, encourages residents' sense of independence and reduces labor costs through the use of electronic monitoring.

Through the use of sensors, the augmented individualized management system (AIMS) can monitor selected activities of daily living (ADL) and health risks of residents. Fusing these data will form the basis for predictive models of care for care givers and can cue residents to care for themselves to the extent of their abilities.

The proposed system will use existing technological monitoring currently being piloted at the applicant organization, Elite Care at Oatfield Estates, develop new monitoring technologies, and fuse the data to create feedback to direct caregivers' care to residents. To achieve the aims of this project, AIMS R&D must overcome multiple scientific and technology barriers in five areas: sensors, data fusion, activity modeling, assistance and systems integration.

The engineering problems. Sensor networks are the first challenge. AIMS must continuously track residents and staff indoors and out to resolutions of one foot, determine their proximity to facility objects and each other in real time, and monitor many physiological signs non-invasively and unobtrusively. The systems challenge is as daunting. AIMS is a diverse combination of embedded, sensor, database, intelligence, communication, networking, and control technologies never before integrated. Despite this complexity, AIMS must perform compute-intensive, scientific processing in real-time on huge data streams with high reliability and accuracy. Existing sensors that have been primarily used for industrial applications have never been combined on a common platform to allow the data to be access on a real time basis to assist in the quality of life as well as increase the functioning level of the resident.

AIMS must fuse sensor data about a person's actions and clinical signs, along with environmental conditions and situational information, into estimated activity states. Predictive modeling must integrate sequences of activity states into high-level models of activities of daily living. From these models, plan recognition techniques must determine intention in order to assist residents. Finding useful prompts and dialogs to assist persons with cognitive disability is the final barrier. Adaptive techniques will enable AIMS to learn which prompts work until there are theoretical models of how people with cognitive disabilities perform tasks. Predictive modeling also fuses a resident's clinical state and activity performance into estimates of health state (physical and mental), thus enabling AIMS to prompt staff for health care. All these advanced technologies must blend end-to-end to realize meaningful assistance to residents.

Innovations. Many innovations are planned, including: (1) local area positioning system for indoor tracking, (2) smart scene sensors that protect individual privacy, (3) Bayesian inference networks to estimate action states, (4) a spatio-temporal data model of facility activity, (5) extended hidden Markov models for predictive activity modeling, (6) decision theoretic control of the assistance user interface, (7) real-time web service standards for open systems integration, and (8) adaptive technologies and evolutionary architectures.

Other Research: All other research in AIMS focuses on smart homes for independent living. Prolonging productive, independent living at home is the ultimate goal of care technologies. However, the path to this vision is for LTCF. Larger settings offer significant economic and technical advantages over homes. The large, long-term care industry converges in facilities; home care is a minor, fragmented segment. Home automation is a component business; plug-and-play AIMS will arrive only after interfaces are worked out in facilities. Facilities offer the necessary economy of scale to support this development.

Technology Impact. Integrated AIMS will foster open interfaces for medical monitors and assistive devices. Local positioning technology can be put in mobile units, e.g. to track emergency services. Fusion and modeling will provide a new foundation for further research.

R&D Plan. The plan is to use extreme programming and extreme sensor integration on an existing site. This will accelerate the time frame and leverage of the existing system which is in place. By doing it this way we will be able to attain results in a very short time frame. Otherwise it would take many more years to go from engineering to beta test to roll out. With the age wave upon us and the lack of nurses and other care givers in the pipeline it becomes imperative that new systems are developed quickly. It should be noted that the system that we will be implementing at Oatfield Estates is a redundant system as it is not need or required by regulation so in no way impedes or lowers the quality of life for existing residents. Not sure we need this.

Economic Merit. Medicare and Medicaid costs are soon expected to outstrip revenue.. The largest drain on the system is the rapidly increasing elder population and their care. The second largest drain are the MR (mentally retarded) and DD (developmentally disabled) populations that are starting to age and their primary care givers are starting to need care as well. Without implementing systems such as AIMS that leverage both the patients own abilities so they need less help, and the caregivers ability, we will be ill prepared to afford the necessary care for the baby boomers when they begin needing assistive care.

AIMS Markets. The markets for AIMS are the frail elderly and handicapped MR DD populations who want to maintain their independence or LCTF who want to leverage and augment their knowledge and staff with technology. AIMS will reach a $200M U.S. market within a few years (about 2010) and grow to several $B in the next decade.. Along with other AIMS applications (e.g. day-care, emergency service, prison) the world market ii estimated to be $10B by 2020.

The Economic Path. The benefits to individuals and facilities will drive the commercialization. Technology license and research publications will disseminate results. Elite Care will commercialize LCTF AIMS with four R&D phases and a strategic marketing plan.

The Social Imperative. AIMS is the promise of compassionate, cost-effective, long-term care to extend the independent, productive, and healthy years of our citizens and enrich their lives. AIMS will foster communities more like extended families, instead of dependents. AIMS could reduce health-care costs by early detection of health risks and fostering resident activity. This approach can help redirect some of our nation's health care expenditures to other arenas. As care costs soar and staff decline, NIST/ATP can greatly accelerate AIMS to help solve the nation's looming crisis in long-term care.

The Florida State University

College of Medicine

Tallahassee, Florida 32306-4300
Telephone: (850) 644-2250, FAX: (850) 644-0158

4/14/2004

Regarding: NIST ATP proposal

To whom it may concern;

I lend my full support to Elite Care's proposal for a NIST ATP grant for developing a systematic method for utilizing clinical data obtained electronically to better manage elder residents in a community-based care facility. Elite Care has been a national model for implementing real life applications of the "Smart Home" technology in congregate living. While many Smart Home model programs exist at universities, there are very few models that actually employ a licensed care facility to test its applications. This unique aspect is vitally important to translate the good idea of using electronic monitoring and communications in long term care into a usable, affordable solution for the future.

The need for such an approach is undeniable. Economic pressures are hitting up against never-before-seen demographic changes that demand new solutions to the many failures seen in long term care. A recent report on the future of family medicine (http://www.annfammed.org/cgi/content/full/2/suppl_1/s3) documents how adoption of electronic approaches to health care is a necessary component to the very survival of family medicine as a discipline. The entire medical care system is beginning to focus more on chronic disease management (rather than the traditional approach of acute care) and certainly community-based long term care is a significant portion of that movement. There is increasing recognition that transitions in care, i.e., when a resident moves from their assisted living to a hospital or nursing home, are the points at which medical errors are most likely to occur. The ever growing complexity of health care demands 21st century approaches to managing problems to prevent them when possible, catch them quickly when they occur, and ensure that the problem is completely addressed and follow-up is ensured. It is for all these reasons that the initiatives being investigated at Elite Care are worthwhile areas of study.

The team at Elite Care is incredibly dedicated to their mission and extremely innovative in their approaches. They have been able to forge numerous close working collaborations with scientists who provide insight and guidance. They have excellent information technology experts that have designed simple and accessible technologies for use in their environment. They have dedicated staff to provide the care that serves as the "learning laboratory" for their innovations. And they have a compassionate and caring approach to aging that ensures success.

I strongly urge you to give their proposal your support.

Sincerely,

Kenneth Brummel-Smith, MD
Chair, Department of Geriatrics

The Arc

The Arc of the United States

People First, Visionary Leadership,
Community Participation, Diversity, Integrity and Excellence

Reply to:
☑ 1010 Wayne Ave., Suite 650
Silver Spring, MD 20910
(301) 565-3842 (301) 565-3843 Fax

Reply to:
☐ 1331 H St., NW, Suite 301
Washington, D.C. 20005
(202) 783-2229 (202) 783-8250 Fax

The national organization of and for people with mental retardation and related disabilities and their families

April 13, 2004

Bill Reed
President and CEO, Elite Care
4444 SE Oatfield Hill Road
Milwaukie, OR 97267

Dear Bill:

I am pleased to offer The Arc's support of the application you are submitting with HSU to NIST for an ATP grant. The Arc is the nation's oldest and largest family and consumer organization for people with cognitive, intellectual and developmental disabilities. The work you are doing is important to the future of The Arc's constituents, people with cognitive, intellectual and developmental disabilities.

Being able to determine how to record and analyze longitudinal information on residents and staff, looking for subtle differences that help predict changes in condition and then reacting would be invaluable for programs serving people who have support needs, but can be made more independent with the use of the technology you are perfecting.

Being able to record this information and feed it back to the proper personnel so when questions arise about ones condition you are able to answer questions that might be asked, whether they are mobility, socialization, eating, vital signs, bowel movements sleep patterns and stability, can improve both the care of the individual in question, and make the most effective use of limited staff resources.

Staff resources comprise approximately 75% of the cost of services for people with cognitive, intellectual and developmental disabilities. We are desperately seeking solutions that would make staff more effective, and that can allow for fewer staff to support people in ways that they want to live. We are hopeful that your technology will assist in making staff more productive and, if we can extend the capability and span of control of staff, we can compensate them better helping to reduce turnover. The technology has the potential of doing all of this while increasing the independence and decisionmaking ability of people with disabilities.

Please le tem know if I can provide any further information.

Sincerely,

Steven M. Eidelman
Executive Director

MAYO CLINIC

200 First Street SW
Rochester, Minnesota 55905
507-284-2511

Eric G. Tangalos, M.D.
Internal Medicine

April 9, 2004

RE: Elite Care Grant Application to NIST ATP

To Whom It May Concern:

I am pleased to endorse the application from Elite Care to study the care giver model of support they have created in Oregon. I have been involved with the development of their programs since inception and can attest to the use of smart technologies for the care of the frail and vulnerable. Their assisted living model is unique in its approach to achieve a maximum level of independence for each resident irrespective of the clinical condition.

I have worked with both their Intel and Oregon Health Sciences University partners as well. This is an excellent team that understands the clinical needs of the patient as well as the technology that underpins their unique approach. Mathematical models to predict change can be accomplished by these investigators. The NIST ATP Grant will allow the synthesis of data to create reproducible and generalizable action plans.

The Elite Care team has now been at this for quite some time. They have the tenacity to deliver an exciting product that is valid not only in the commercial world but to the research community as well.

Eric G. Tangalos, M.D.
Professor of Medicine
Chair, Division of Primary Care Medicine

EGT/ams

Center for Aging Services Technologies CAST

2519 Connecticut Avenue, NW
Washington, DC 20008-1520
www.agingtech.org

Phone (202) 508-9463
Fax (202) 220-0032

April 9, 2004

To whom it may concern:

This letter is to show my support for Elite Care in their effort to obtain a grant from the NIST Advanced Technology Program. As Executive Director of the Center of Aging Service Technologies (CAST), I recognize the leadership they have shown in demonstrating how technology can help benefit the care provided to older adults. As someone personally acquainted with the Elite Care management team, I believe that they have the determination and expertise to do so.

In the two years that I have been familiar with the project, Elite Care has pioneered a unique, and highly sophisticated, passive monitoring framework and data collection environment. Their development team has taken patient monitoring to a high level of completeness while minimizing the obtrusiveness to daily patient life.

While the monitoring mechanism firmly established, Elite Care has come to the next, and perhaps more challenging, stage of development. The rich data set collected continuously on every patient must be interpreted to offer any real value. The interpretation itself is complex and unprecedented. Algorithms must be developed to convert the data into both diagnostic and predictive diagnoses. These diagnoses must then be presented to the proper party (i.e. resident, caregiver, or doctor) in the format most useful to them.

The task of mining such voluminous data is daunting, but I believe the Elder Care team has the wherewithal to accomplish their goals and to the help others in the field benefit by the knowledge gathered.

Elite Care currently has the support of Intel and OHSU. Joyce Collings is acting as the primary investigator. A grant from NIST ATP would allow them to make important advances to help the entire field. I support their application for this grant and hope you give it positive consideration.

Sincerely,

Russell T. Bodoff
Executive Director